Environment Canada | Environnement Canada
Canadian Forestry Service | Service canadien des forêts

PROGRAM REVIEW

GREAT LAKES FOREST RESEARCH CENTRE

1982-83

Environment Canada | Environnement Canada

1038394D DEST PVM EXCH COPY 03

VOL ISS 82-83
GREAT LAKES FOREST RESEARCH CENTRE.
PROGRAM REVIEW

PROGRAM REVIEW

GREAT LAKES FOREST RESEARCH CENTRE

CANADIAN FORESTRY SERVICE

DEPARTMENT OF THE ENVIRONMENT

1982-83

©Minister of Supply and Services Canada 1983
Catalogue No. Fo41-12/1983E
ISBN 0-662-12652-1
ISSN 0822-1650

Copies of this publication may be obtained from:
Great Lakes Forest Research Centre
Canadian Forestry Service
Department of the Environment
P.O. Box 490
Sault Ste. Marie, Ontario
P6A 5M7

THE CANADIAN FORESTRY SERVICE

DEPARTMENT OF THE ENVIRONMENT

The Canadian Forestry Service (CFS) is the principal source of federal expertise in forestry. Its general objective is to promote the wise management and use of Canada's forest resource for the economic, social, and environmental benefit of Canadians.

The following are the main functions of the CFS:

1. providing coordinated federal policies to promote forest industry development and better resource management;

2. providing scientific and technical leadership through research and development;

3. providing and analyzing national and international information and statistics as a basis for policy;

4. aiding in developing and certifying codes and standards of product performance;

5. protecting Canada's forests from foreign pests;

6. supporting provincial forest renewal programs to insure permanent viability of the forest resource;

7. fostering the potential use of the forest resource for energy;

8. contributing to the environmental objectives of the Department of the Environment.

A number of federal agencies are involved in forestry programs, and a Federal Forestry Sector Strategy Committee has been established to coordinate federal forestry activities. The CFS has been designated the lead agency.

In September, 1982, the CFS assumed responsibility for regional economic development from a forestry standpoint. In this context the Service is required to negotiate federal-provincial forest renewal agreements of intensive forest management practices to meet the objective of the federal

Forestry Sector Strategy. As a result, the CFS is also involved in the development of economic profiles and studies to identify regional and national needs, and development opportunities.

The CFS is composed of a headquarters unit, six forest research centres, and two national institutes. The forest research centres are responsive to regional priorities and maintain close liaison with the respective provincial government forestry departments. They also participate in, and frequently lead, national programs. The national institutes provide the focus for programs of national scope. The headquarters unit comprises three directorates: Research and Technical Services, which plans, directs and coordinates the research and development programs and technical services of the CFS; Forestry Relations, Economics, and Development, which handles forestry relations with universities, industry and other governments, does economic analyses, and coordinates the forestry development and employment stimulation programs; and Finance, Planning, and Administration, which manages the support services of the CFS in planning and program evaluation, finance, administration, and human resources management.

LE SERVICE CANADIEN DES FORÊTS

MINISTÈRE DE L'ENVIRONNEMENT

Le Service canadien des forêts (SCF) réunit la majorité des spécialistes fédéraux en foresterie. Son objectif général est de promouvoir l'aménagement et l'utilisation judicieux des ressources forestières du Canada pour le plus grand bien économique, social et environnemental des Canadiens.

Voici les principales fonctions du SCF:

1. fournir des politiques fédérales coordonnées afin de favoriser l'expansion de l'industrie forestière et l'amélioration de la gestion des ressources;

2. fournir une orientation scientifique et technique par la recherche et le développement;

3. fournir et analyser l'information et les statistiques nationales et internationales qui serviront de base aux politiques;

4. aider à la mise au point et à la certification des codes et des normes en matière de performance des produits;

5. protéger les forêts canadiennes en luttant contre les ravageurs étrangers;

6. appuyer les programmes provinciaux de régénération forestière afin d'assurer la viabilité permanente des ressources forestières;

7. parrainer l'utilisation éventuelle des ressources forestières pour la production d'énergie;

8. adhérer aux objectifs environnementaux du ministère de l'Environnement.

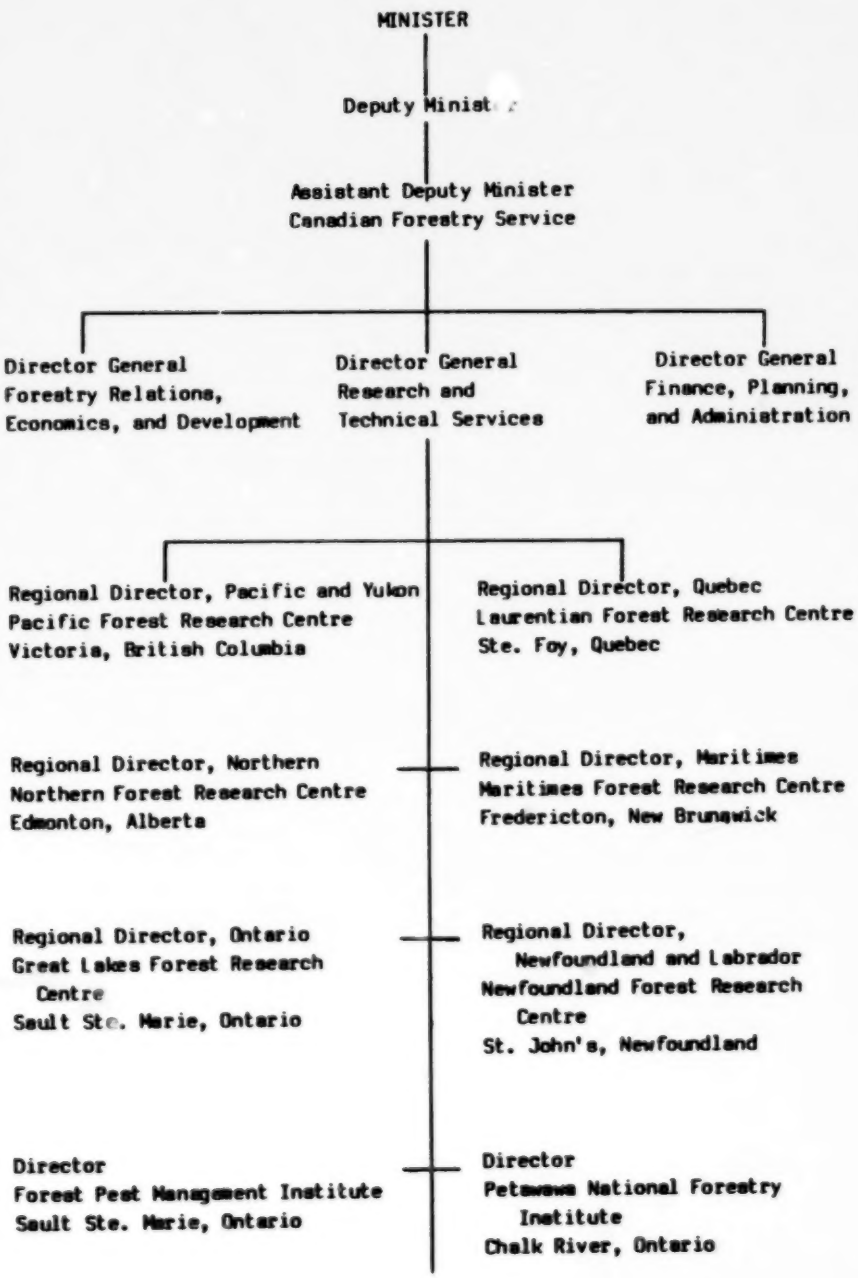
Depuis septembre 1982, le SCF assume la responsabilité du développement économique régional dans le domaine forestier. À ce titre, il doit conclure des ententes fédérales-provinciales, relatives à la régénération forestière, sur des méthodes de gestion intensive des forêts afin d'atteindre les objectifs de la stratégie forestière du Canada. Le SCF doit conséquemment participer à la mise au point de profils et d'études économiques afin de cerner les besoins sur les plans régionaux et nationaux, de même qu'aux possibilités de développement.

Le SCF comprend une administration centrale, six centres de recherches forestières et deux instituts nationaux. Les centres de recherches forestières doivent répondre aux impératifs régionaux et entretenir une

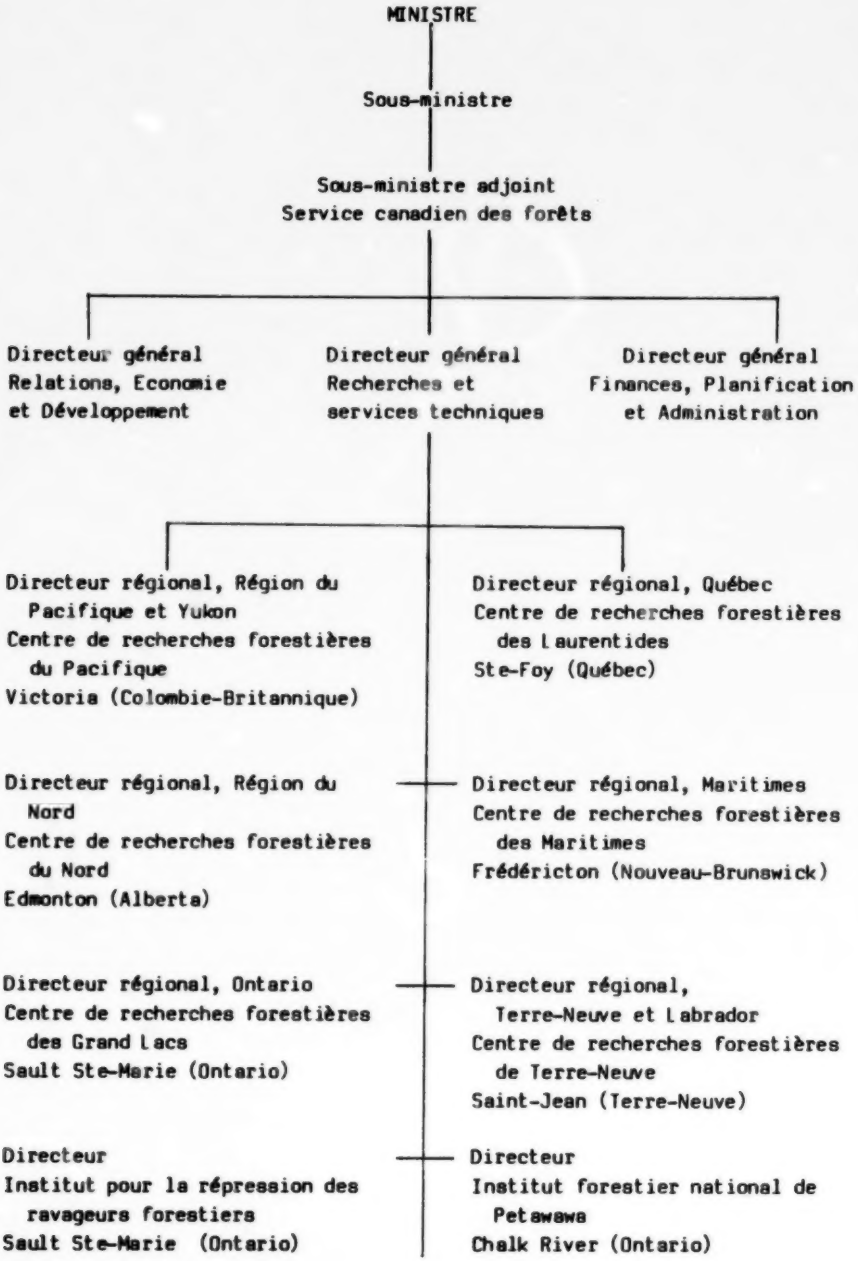
liaison étroite avec les ministères provinciaux des Forêts. Ils participent également à des programmes nationaux dont ils assument fréquemment la direction. Les instituts nationaux sont les foyers des programmes d'envergure nationale.

L'Administration centrale comprend trois directions générales: Recherche et Services techniques, dont le rôle consiste à planifier, diriger et coordonner les programmes de recherche et développement ainsi que les services techniques du SCF; Relations, Économie et Développement, qui s'occupe des relations forestières avec les universités, l'industrie et les autres gouvernements, fait des analyses économiques, et coordine des programmes de développement forestier et de création d'emplois; et Finances, Planification et Administration, qui dirige les services de soutien du SCF dans la planification, l'évaluation des programmes, les finances, l'administration et la gestion du personnel.

DEPARTMENT OF THE ENVIRONMENT



MINISTÈRE DE L'ENVIRONNEMENT



FOREWORD

The Great Lakes Forest Research Centre (GLFRC), located in Sault Ste. Marie, Ontario, is one of six regional forestry centres operated by the Canadian Forestry Service (CFS). The overall objective of the Service is "to promote the wise management and use of Canada's forest resource for the economic, social, and environmental benefit of Canadians". GLFRC is involved in a program of forest research and regional forestry development in Ontario.

Since its inception in 1965, GLFRC has been concerned primarily with forestry and forestry-related research and associated technical services. During 1982-83, however, the responsibilities of the CFS were increased and expanded dramatically and these new responsibilities have had a major impact on the program of GLFRC. In September 1982 the Centre became responsible for the federal management and administration of the Canada-Ontario Forest Management Subsidiary Agreement, and in 1983 became responsible for Ontario programs within the Forestry Employment Stimulation Program, which is cosponsored by the Canada Employment and Immigration Commission. In addition, the Centre is responsible for developing a new Canada-Ontario Forest Resource Development Agreement to replace the current agreement, which expires on 31 March 1984.

Two major Program Directorates have been established for the effective management of both new and continuing programs. The Program Director for Research and Technical Services is C.R. Sullivan, and the Program Director for Forestry Development is R.A. Haig. Mr. Haig also serves as Deputy Director. Nine additional person-years were transferred to the Centre for Forestry Development.

A major portion of the research program continues to be concerned with the issue of long-term wood supply. We are involved in various forest renewal projects, with emphasis on black spruce ecosystem silviculture and on mechanization of silviculture. A major effort is also directed to the reduction of losses from insects, diseases and fires. Projects deal with forest fires, spruce budworm, biological control of insects and forest pathology. A major cooperative project deals with the impact of long-range transport of air pollutants on forest ecosystems. Because of the transprovincial nature of our forest resource, many elements of our research program are of national significance.

The Centre is involved in a number of national technical services programs. These include the Forest Insect and Disease Survey, a continuing program of surveillance of forest insect and disease conditions, and the Canadian Forestry Resource Data Program, which provides statistical information on Canada's forests. The Centre also provides the major federal focus for forestry in Ontario.

Much of our research is carried out in cooperation with the province of Ontario. Under a Canada-Ontario agreement, a Canada-Ontario Joint Forestry Research Committee has been established to coordinate planning and implementation of forestry research programs carried out by both governments. In 1982-83 the committee sponsored a symposium on spruce budworm and published comprehensive proceedings of a symposium on Canadian containerized tree seedlings.

During 1982-83 four projects were terminated: the management of amenity trees and plantations, in which the main focus was on Dutch elm disease; vegetational ecology of the coastal zone of the Hudson Bay Lowland; northern Ontario pulpwood fertilization; and management of pine mixedwoods. Staff involved were transferred to higher-priority projects.

This report outlines progress made during fiscal year 1982-83 on each project. With the assumption of new responsibilities our budget increased to $19 million, and we had a full-time staff of 163. During the year major management appointments included E.S. Kondo, Research Manager, Environmental Forestry and Fire; L.F. Riley, Research Manager, Forest Resources; D.W.J. McGowan, Chief Implementation Officer; and J.H. Smyth, Chief, Socio-economic Analysis and Planning.

Five long-term employees of the Centre retired in 1982-83. These were J. Ross, Accounts Clerk; M. Davidson, Stenographer, Forest Insect and Disease Survey; C.F. Linklater, Office Services Supervisor; K.J. Griffiths, Research Scientist, Biological Control; and K.C. Hall, District Ranger Supervisor, Forest Insect and Disease Survey. Collectively, these five employees had accumulated 128 years of experience with the Canadian Forestry Service. During the year, A. Silc, Technician, Black Spruce Ecosystem Silviculture, passed away.

J.H. Cayford
Regional Director

Table of Contents

Page

Forest Environment Research 1

Impact of Long-range Transport of Air Pollutants on the Biogeochemistry of Forest Ecosystems 3

Forest Production Research 5

Black Spruce Ecosystem Silviculture 7
Biological and Operational Aspects of the Mechanization of Silviculture 8

Forest Protection Research 11

Forest Fire Research 13
Gremmeniella Diseases of Conifers 14
Management of Boreal Mixedwoods (Pathological Aspects) 14
Spruce Budworm Control Research 15
Insect Control Research Emphasizing Biological Methods 16

Forest Utilization Research 19

Energy from Forest Biomass 21

Forestry Services 23

Forest Insect and Disease Survey 25
Forest Resources Data 26
Liaison, Development, and Technical Services 27

(Cont'd)

Table of Contents (concl.)

Page

Forestry Development 29

Economic Studies and Development 31
Development Agreements 32
Employment Stimulation 33

Management 35

Administration 39

Technical Support Services 43

Information Services and Public Awareness 47

Terminated Projects 51

Appendices 53

Organization Chart 55

Expenditures 56

Contracts Let or Supervised by the Great Lakes Forest Research Centre 57

Publications 59

Forest Environment Research

Impact of Long-Range Transport of Air Pollutants on the Biogeochemistry of Forest Ecosystems

Project Staff:

I.K. Morrison (Project Leader)
L. Chartrand, N.W. Foster,
A.W. Johns, D.J. Kurylo,
J.A. Nicolson, J.A. Ramakers,
D. Ropke

Objectives

To elucidate the influence of atmospheric deposition of acidifying substances on biogeochemical properties and processes, and on productivity of old-growth hard maple-yellow birch forest on shallow till soil; to elucidate the influence of forests and forest soil on acid precipitation.

Achievements

Streamflow and stream chemistry were monitored weekly at gauging stations and terrestrial catchments; throughfall, stemflow, forest floor percolate and litterfall were monitored at the intensive study site and at two satellite sites; snowfall (amount and chemistry) was recorded fortnightly during the winter; biomass and bioelement estimates and a line plot survey of the Turkey Lake watershed were completed; tension lysimeters for the study of deep percolates were set up and a litter decomposition experiment on the principal and satellite study sites was continued; project staff acted as scientific authority for contracts with Queen's University on the degeneration effects of acid precipitation on eastern Canadian forest soils and with the University of Toronto on the determination of the toxicity of aluminum to the root systems of boreal forest trees under controlled conditions.

Forest Production Research

Black Spruce Ecosystem Silviculture

Project Staff:

J.K. Jeglum (Project Leader)
M.J. Adams, G.T. Atkinson,
R.L. Fleming, N.W. Foster,
A. Groot, V.F. Haavisto,
A.W. Johns, I.K. Morrison,
J.A. Nicolson, B. Payandeh,
M. Siltanen, R.A. Sims,
S. Taylor

Objectives

On the basis of ecological and economic considerations, to develop silvicultural techniques for managing black spruce forests in Ontario; to develop a classification system for black spruce ecosystem types in Ontario for forest management purposes; to determine if modified cutting and direct seeding are feasible alternatives to clearcutting and planting for regenerating black spruce; to determine the feasibility of intensive management treatments for increasing black spruce peatland productivity; to determine the impact of current forest management practices on black spruce ecosystems and to recommend alternatives; to promote the application of the results of the project to government and industry by means of technology transfer.

Achievements

Advance growth and productivity data were analyzed and an overview paper was presented on forest ecosystem classification; field studies were begun on lowland black spruce seeding; a literature review on seed-dependent black spruce regeneration methods was undertaken; Nipigon stripcut and blowdown studies were continued and reports were prepared; seeding trials for upland black spruce regeneration were continued and aerial seed deposition and distribution trials were

conducted; a seed testing facility was established at GLFRC; experimentation on delaying and enhancing black spruce seed germination was continued and a report was prepared; two reports were written on growth and yield studies; watershed data on black spruce ecosystem impact studies were collected; chemical analyses of soil samples from a nutrient distribution study of mature black spruce forests were completed; field surveys investigating factors associated with the abundance of black spruce advance growth were completed and an overview paper on peatland forestry was prepared.

Biological and Operational Aspects of the Mechanization of Silviculture

Project Staff:

L.F. Riley (Project Leader)
B.R. Canning, F.W. Curtis,
F.F. Foreman, D.J. Kennington,
J-D. Leblanc, D.L. Marles,
E.G. Mitchell, J. Richenhaller,
J.B. Scarratt, C.R. Smith,
B.J. Sutherland, R.F. Sutton,
F.W. von Althen, D.P. Webb,
T.P. Weldon, J.E. Wood

Objectives

To develop regeneration methods and associated tree-growing techniques for efficient and effective stand establishment and treatment; to develop biologically sound, mechanized techniques for the efficient and effective conduct of silvicultural operations in Canada; to develop and maintain a continuing liaison with other forest management agencies in Canada so as to promote and foster the application of mechanized silvicultural techniques.

Achievements

Organization of the national mechanization of silviculture program and the majority of staffing actions were completed; an information bank system for

silvicultural equipment was developed; trials were conducted to compare the effectiveness of site preparation equipment on full-tree and tree-length harvested areas; trials of the Moss Silvaplanter were conducted; an aerial seeding study to improve jack pine regeneration on burn areas was begun and a new sampling procedure was developed; reports were prepared on aerial seeding by a Venturi seeder and on 10-year growth response of jack pine to thinning; a major report was published on planting season extension; research on container stock outplant performance was reviewed; the Proceedings of the Canadian Containerized Tree Seedling Symposium were published; plantations were established to compare performance of various grades of container stock; experiments were established to determine the effects of container planting, time of planting and various outplanting treatments on survival and growth of southern Ontario hardwood species.

Forest Protection Research

Forest Fire Research

Project Staff:

B.J. Stocks (Unit Head)
T. Blake, G.R. Hartley,
T.J. Lynham, J.A. Mason,
D.J. McRae

Objectives

To improve presuppression techniques through the development of fire behavior indices for major Ontario forest fuel types and through the performance analysis and calibration of the Canadian Forest Fire Danger Rating System for Ontario conditions; to determine the ecological effects of prescribed fire and wildfire on forest ecosystems and relate these to understandable fire behavior parameters.

Achievements

Three experimental burns were conducted in standing budworm-killed balsam fir stands, to complete the burning sequence required for the development of fire behavior indices for the fuel type; the Ontario Fire Weather and Fire Report Data Bank was revised and reorganized, and an analysis was begun of fire weather and fire occurrence in Ontario for the period 1972-1981; a cooperative agreement was signed with the Intermountain Forest and Range Experiment Station (USDA Forest Service) to facilitate exchange of information in an effort to model crown fire propagation.

Gremmeniella Diseases of Conifers

Project Staff:

C.E. Dorworth (Project Leader)
C.N. Davis, W.C. Richards,
S. Takai

Objectives

To develop ecologically satisfactory techniques for control of each race of **Gremmeniella abietina** as it attacks conifers and, as far as possible, to correlate disease syndromes with inceptive races.

Achievements

Published recommendations were combined with a training program for Ontario Ministry of Natural Resources (OMNR) personnel in an attempt to suppress **Gremmeniella** infections in 160 red pine stands in the Parry Sound District; **Gremmeniella** races were cultured and characterized in numerous isolates submitted by various national and international agencies; a meeting was held between Canadian and American plant quarantine boards to evaluate the current requirement for a quarantine against **G. abietina.**

Management of Boreal Mixedwoods (Pathological Aspects)

Project Staff:

J.T. Basham (Project Leader)
W.E. Britnell, R. Broadbent,
B.E. Smith, R.D. Whitney

Objectives

To determine the extent, impact, and causal agencies associated with root and butt rot in white spruce, black spruce, and balsam fir in Ontario; to develop silvicultural and management tools to

minimize the impact of stem and root decay in trembling aspen; to determine the rate of stem deterioration and the reduction in pulp yield and quality for balsam fir killed by spruce budworm defoliation as a means of improving the prediction of losses and the effectiveness of salvage.

Achievements

Decay and stain were evaluated in discs of 220 black spruce windfalls and 1600 disease cultures were prepared in an effort to determine the effect of root rot in predisposing the species to windfall; a report on forest pathology in Canada was prepared with other Canadian pathologists and submitted to CFS management; reports were prepared on the effects of herbicide spraying and scarification on the quality of boreal aspen; a status report was prepared on research on the deterioration and utilization of budworm-killed balsam fir.

Spruce Budworm Control Research

Project Staff:

C.J. Sanders (Project Leader)
R.M. Fletcher, G.T. Harvey,
G.S. Lucuik, J. Régnière,
P.M. Roden, W.L. Sippell

Objectives

To develop sex attractant traps as tools for detecting incipient outbreaks of budworm; to determine if the electrophoretic detection of isozymes can be used to identify incipient outbreaks; to explain and forecast budworm outbreaks by studying population dynamics and the processes regulating populations; to develop the

use of the synthetic sex attractant as a method of regulating population density.

Achievements

Several adult budworm traps were deployed across northwestern Ontario in a study to develop a trap that would produce a high correlation between trap catch and larval populations; preliminary analysis of isozyme frequencies between populations revealed variations which in four cases were related to differences in infestation history or population density; intensive field studies were begun to identify the factors regulating populations.

Insect Control Research Emphasizing Biological Methods

Project Staff:

D.R. Wallace (Project Leader)
Z.M. Faux, S. Fera,
K.J. Griffiths (1982),
D.B. Lyons, D.L. Oliver

Objectives

To develop economically acceptable methods for regulating insect numbers with minimal disruption of the environment, and to demonstrate the applicability of such methods to forest management in Ontario.

Achievements

The parasites **Anastatus disparis** and **Olesicampe benefactor** were released, the former against gypsy moth and the latter against larch sawfly; major emphasis was

placed on the planning and assessment of an experimental aerial release of the parasite **Trichogramma minutum** against the spruce budworm.

Forest Utilization Research

Energy from Forest Biomass

Project Staff:

L.F. Riley (Project Leader)
B.J. Sutherland

Objectives

To develop and test prototype equipment for the collection and comminution of forest biomass in the forest.

Achievements

A report was published on a feasibility study for the conversion of a fossil-fueled energy plant to a biomass-fueled plant at CFB Borden; the Pallari Brush-arvester was redesigned to meet North American specifications; two contract projects were taken over from CFS head-quarters; a project was undertaken to develop a slash reclaimer and comminutor to reduce moisture content and slash load bulk; a project was begun to develop a comminution unit to handle logging slash at landings.

Forestry Services

Forest Insect and Disease Survey

Project Staff:

G.M. Howse (Unit Head)
M.J. Applejohn, C.A. Barnes,
W.D. Biggs, H. Brodersen,
D.C. Constable,
E.J. Czerwinski,
M. Davidson (1982),
E.B. Dorworth, H. Evans,
H.L. Gross, K. Hall (1982),
W.A. Ingram, V. Jansons,
C.G. Jones, H.D. Lawrence,
L.S. MacLeod, R.K. McCron,
J. Meating, Z. Moynan,
D.T. Myren, D.B. Roden,
R.J. Sajan, L.A. (Slight) Cree,
K. Smith, P.D. Syme,
M.J. Thomson, H.J. Weir

Objectives

To provide, for national and regional use, accurate and timely information on the kind, severity and extent of forest insect and disease problems and on their impact on the forest resource in Ontario; to provide forest managers with information needed for decision-making with respect to control operations; to advise and assist the province in planning and evaluating the effectiveness of control operations; to advise and assist researchers in planning and assessing experimental trials; to increase, through research, the efficiency and effectiveness of procedures used in forest insect and disease surveys and assessments; to elucidate for possible forest management purposes and for scientific use the bionomics of new or little-known forest pests and their potential significance; to transfer information on insect and disease occurrence and control to forest managers, industry and the general public.

Achievements

General surveys were conducted to detect the presence of, to identify, to map the damage of, and to measure the impact of important forest insects and diseases; over 4300 insect and disease samples were collected and identified; in cooperation with provincial authorities, forest pest control strategies were conducted and

assessments were made of federal/provincial spray trials against the gypsy moth and provincial aerial control operations against the spruce budworm; special surveys were carried out on pests of red and jack pine plantations and on seed and cone pests in high-value seed production areas; studies were initiated on the impact of major insects and diseases to estimate increment growth and mortality losses; project staff participated in the Central International Forest Insect and Disease Conference and in the planning of a spruce budworm symposium; a report was prepared on multileadering and biological information was provided for provincial initiatives against forest pests.

Forest Resources Data

Project Staff:

J.H. Smyth (Project Leader)
A. Brownwright, K. Ramsay

Objectives

To provide forestry statistics required by the federal government for the purpose of planning and fulfilling its national forestry obligations.

Achievements

A compendium of Ontario forestry statistics was compiled; a statistical data base of Ontario communities fully or partially dependent on the forest industry was completed; a cooperative project was undertaken with the Canadian Pulp and Paper Association to conduct a national study

on forest management expenditures; and a computerized data base of statistics related to the forestry sector in Ontario and Canada was maintained.

Liaison, Development, and Technical Services

Project Staff:

L.F. Riley (Unit Head)
F.F. Foreman, D.J. Kennington, J-D. Leblanc, J. Richenhaller, C.R. Smith, B.J. Sutherland

Objectives

To undertake activities on behalf of GLFRC in areas of concern not related to existing research projects; to provide advisory, operational and technical support services to staff and to other forestry-related agencies as required.

Achievements

A stand improvement harvest was conducted at CFB Borden; the first draft of a forest management plan for CFB Borden was completed; Christmas tree production research was continued and a report on customer preference surveys was prepared; development and operation of a forest ecology trail were continued.

Forestry Development

Economic Studies and Development

Project Staff:

J.H. Smyth (Project Leader)
S. Andersen, A. Brownwright,
K. Ramsay

Objectives

To provide advice to other federal departments, provincial government agencies and private industry on programs concerned with forest management or forest industry development; to provide economics input for program and project evaluation at GLFRC and elsewhere in the Department of the Environment (DOE); to provide input for federal policy initiatives in forest management and forest industry development; to study the economic aspects of various forest management and forest-based industry issues; to provide an economic perspective in the administration, implementation and evaluation of the Canada-Ontario Forest Management Subsidiary Agreement (FMSA); to undertake economic studies in support of an initiative to develop a new forest resource development agreement for the period 1984-89.

Achievements

A cooperative CFS-OMNR socio-economic survey of Ontario private forest landowners was completed; a framework for evaluating the hybrid poplar program conducted under the Canada-Ontario Community and Rural Reserve Subsidiary Agreement was developed and the evaluation was carried out under contract; a study of industrial private forest lands was undertaken to provide background information necessary for the development of a program of forest renewal and intensive forest management on such lands.

Development Agreements

Project Staff:

D.W.J. McGowan (Project Leader)
A.J. Ballak, G.D. Huntley,
R.L. Macnaughton

Objectives

To manage and administer the FMSA and to monitor progress and expenditures; to develop guidelines for the evaluation of the FMSA in conjunction with involved provincial agencies; to ensure adequate federal participation in public relations activities related to the FMSA; to develop a new forest resource development agreement to become effective in April 1984.

Achievements

Management responsibility for the FMSA was transferred from the Department of Regional Economic Expansion (DREE) to GLFRC and a new management committee was appointed; preliminary discussions were held with OMNR and the Ministry of Treasury and Economics about a new forest resource development agreement; the hybrid poplar program was evaluated with a view to extending it; a film on the FMSA entitled "The Greening of the North" was completed and distributed for presentation.

Employment Stimulation

Project Staff:

D.W.J. McGowan (Project Leader)
A.J. Ballak, G.D. Huntley,
R.L. Macnaughton

Objectives

To create immediate job opportunities for the forestry sector, in projects that will contribute to forest renewal, intensive forest management, and protection.

Achievements

The Unemployment Insurance/Job Creation Program - Forestry Sector was implemented; over 55 projects were approved and 51 of these were under way by the end of fiscal 1982-83, with a total of 785 workers employed for 24 708 work weeks; a new three-party job creation program is being negotiated with OMNR and the Canada Employment and Immigration Commission.

Management

Management

Staff:

J.H. Cayford (Director), R.A. Haig, E.S. Kondo, G. Londry (secretary), H.M. MacDonald (secretary), L.F. Riley, M.C. Ruprechter (secretary), C.R. Sullivan

Objectives

To provide direction, planning and supervision for the research and forestry development programs at GLFRC, and to ensure that efficient administrative services are provided.

Achievements

Responsibility was assumed for managing the FMSA, for negotiating a new federal-provincial forestry agreement and for managing a job creation program; the GLFRC management structure was reorganized and staff appointments were made to reflect changed responsibilities; biennial evaluations were completed for seven projects; a COJFRC forest managers' meeting and an Ontario Research Forum were organized and a COJFRC symposium on spruce budworm was cosponsored; four projects were completed and staff were reassigned; a national program of research and development in mechanization of silviculture was set up.

Administration

Administration

Staff:

R.M. Dean (Chief),
E.L. Baxter, W. Borland,
W.R. Clarke, L.M. Cormier,
D. Evoy, D.W. Gair,
J. Graham, R.J. Graham,
C. Halliday, J.W. Harazny,
A.Jones, J.C. Kimball,
G.A. King, L.J. Koivisto,
J. Lang, C. Linklater (1982),
H.J. Logtenberg, S. MacLeod,
J. McAlpine, B. McBain,
B.I. McKay, G. McLeod,
B. McMurray, M. Mills,
R. Moffatt, E.F. Morningstar, C. Novick, J. Novick,
K. Pelletier, M.G. Pinder,
D.C. Reid, M. Skouris,
D.I. Sloan, E.C. Steinke,
F.C. Stewart, M.T. Stone,
D.G. Weeks, A. Willis,
A. Zurby

Objectives

To provide administrative, financial, and research and technical support services for GLFRC, and to operate and maintain the physical plant and grounds.

Achievements

A second word processor was installed and two operators were trained; temporary accommodation was purchased for the Forestry Development Program; two vehicles were converted to propane power under the Energy, Mines and Resources conservation program; the financial services section cooperated with CFS headquarters in implementing the Automated Financial Management and Accounting System; GLFRC officially accepted the transfer of development agreements from DREE and staffed two new positions to address the responsibility; a waste chemical burning unit for burning non-toxic waste chemicals was designed and built; major road repairs were completed and new generators were installed at the Turkey Lake research site.

Technical Support Services

Technical Support Services

Staff:

N. Bailey, D.W. Beilhartz, C.L. Bodley, S.B. Burt, N.J. Dukes, J.E. Field, D. Grave, P. Jakibchuk, I.M-J. Kwain, M. Laporte, B. Payandeh, C.A. Plexman, J.A. Ramakers, E.R. Rayner, M.K. Rouse

Objectives

To provide efficient and economical research and technical support services to GLFRC.

Achievements

Approximately 100 manuscripts were edited and processed for publication; the Information Report series was upgraded by changing the format and printing reports commercially; about 150 000 chemical analyses were made on soil, plant and water samples; an atomic absorption spectrophotometer was purchased and installed to meet increased demands for water sample analyses; accessibility to computing facilities was extended by the acquisition of a multiplexor expander, three terminals, and a printer, by upgrading existing equipment, and by purchasing additional software; drafting, electronics and photography services were provided and greenhouses were maintained; literary search services were expanded in the library with the aid of a new computer terminal; a subscription agency was contracted to handle journal subscriptions for the library; preliminary work was done on the compilation of a bibliography of bibliographies.

Information Services and Public Awareness

Information Services and Public Awareness

Staff:

C.A. Plexman (Unit Head)
L.F. Chassé, P. Jakibchuk

Objectives

To publish and disseminate scientific and technical information issuing from GLFRC's research program in response to the needs of provincial and industrial forest managers, and to promote an understanding of the wide use of forest resources among the general public; to promote public awareness, appreciation and understanding of Canada's forested environment through personal experience.

Achievements

Three issues of the Forestry Research Newsletter, four lists of recent publications, and three issues of the Survey Bulletin were published; work was begun on the production of a new audio-visual program on the Centre's research and development projects; news releases were issued as required; four leaflets were published in the GLFRC leaflet series; Environment Week posters and buttons were distributed and a film showing was held; Open House was held during Conservation Week and National Forest Week; a summer tour program was organized and tours were conducted twice daily from mid-June to September; several new displays on the Centre's research projects were constructed and old displays were updated or redone in a bilingual format; a tree planting ceremony was held in conjunction with Conservation Week; meetings were held in Toronto, London, Kingston, and

Sudbury on DOE's policy on information availability and public consultation; the first GLFRC Program Review was published; the second GLFRC bibliography of publications was published; the forest ecology trail was again open to the public, and the existing facilities were maintained and improved; 18 trees were planted in the arboretum.

TERMINATED PROJECTS

Vegetational Ecology of Coastal Zone Hudson Bay Lowlands

No GLFRC field work in this integrated program was conducted during the 1982-83 fiscal year, and the principal investigator was on educational leave during much of the period. Attention was focused on tabulating and assimilating data for publications on an ecological land survey of the Cape Henrietta-Maria area, Hudson Bay; an ecosystem classification study on forested stands near Winisk, Ontario; wetlands of the coastal zone, southern Hudson Bay Lowland; and a final report on the Hudson Bay Lowland integrated program. Manuscripts are in preparation.

Management of Amenity Trees and Plantations

Research showed that resistance to benzimidazole pesticides developed by a number of fungi, including **Ceratocystis ulmi**, can be broken with certain fatty acid synergists. In cooperation with Japanese researchers significant progress was made in the analysis of electrolyte leakage from **Ulmus** tissue exposed to cerato-ulmin. Studies on the relationship between **C. ulmi** and **S. multistriatus** and monitoring of **S. multistriatus** in Sault Ste. Marie were terminated. Scanning electron microscope examination of the stridulation structures and internal morphology of **H. rufipes** was completed. A final report on the Sault Ste. Marie integrated DED control program is in preparation.

Northern Ontario Pulpwood Fertilization

A paper entitled "Importance of chemical reactions and microbial activity in immobilizing urea nitrogen in jack pine humus" was presented at the annual meeting of the American Society of Agronomy. Other manuscripts are in preparation. Final measurements and analyses of the last of some two dozen fertilizer field trials in the northern and northwestern regions of Ontario were completed.

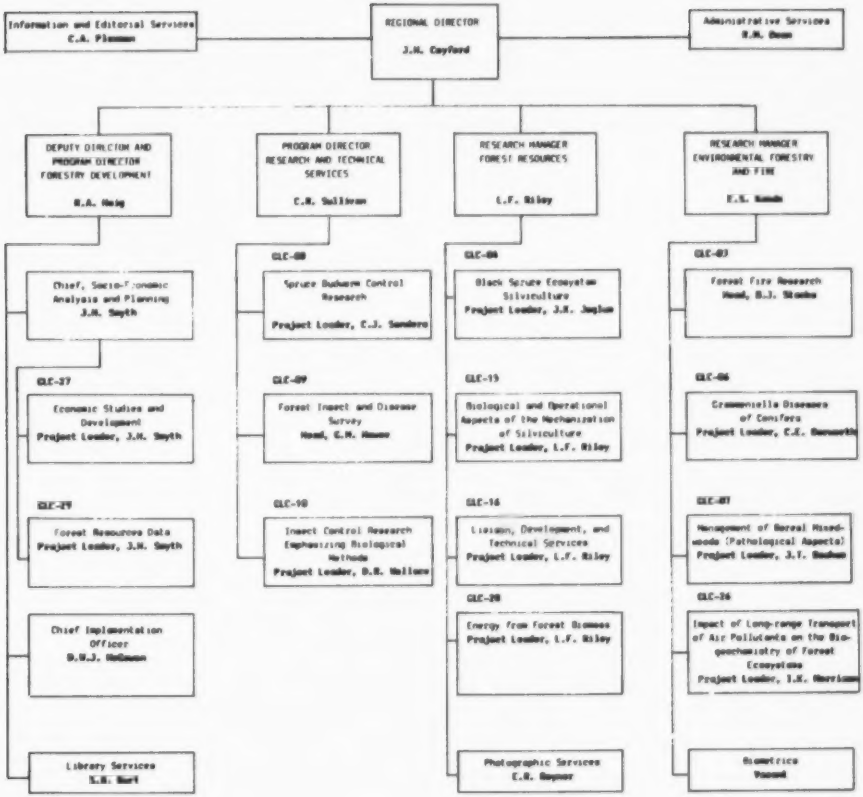
Management of Pine Mixedwoods

A report was prepared on the increased growth of pine sawlogs resulting from improvement cutting in a mixedwood stand. In addition to maintaining a favorable benefit:cost ratio, the treatment preserved the aesthetic

quality of the stands. The analysis of decay resulting from logging injuries sustained during treatment was completed and the results will be published. This study provided further evidence in favor of such treatment, as the 10-year growth of decay induced by logging injuries has not been significant. The project was initiated and conducted largely by the Petawawa National Forestry Institute, with some input by GLFRC. The commitment of the latter is now complete.

Appendices

ORGANIZATION CHART



GREAT LAKES FOREST RESEARCH CENTRE
EXPENDITURES
($ '000)

Program	Person Years	Salaries	Operation and Maintenance	Capital	Grants and Contributions	Total
Forest Environment Research	5.0	177.7	268.2	6.1	---	452.0
Forest Production Research	29.7	862.9	166.8	15.9	---	1 045.6
Forest Protection Research	28.5	1 016.2	109.8	38.2	---	1 164.2
Forest Utilization Research	.6	17.9	---	---	---	17.9
Forestry Services	28.1	792.1	102.3	10.6	---	905.0
Forestry Development	7.9	272.5	74.1	113.4	10 796.9	11 256.9
Management	7.2	309.8	40.0	---	---	349.8
Administration	39.0	857.9	842.3	142.7	---	1 842.9
Technical Support Services	12.8	344.0	122.8	98.3	---	565.1
Information Services and Public Awareness	2.7	65.5	17.1	---	---	82.6
TOTAL	161.5	4 716.5	1 743.4	425.2	10 796.9	17 682.0

CONTRACTS LET OR SUPERVISED BY THE GREAT LAKES FOREST RESEARCH CENTRE

Contractor's Name	Contract Title	Contract Amount
Elmo Design Inc. 647 Tanahawk Cres. Ancaster, Ontario L9G 3W2	Design of a Harvester-Chipper - Conveyor-Storage System to Harvest Brushwood Using the "Pallet Cutting Principle"	$50 220.00 (ENFOR) PAID BY CFS HQ ($50 220.00 pd 82-83)
Hosvey & Associates Co. Ltd. 2378 Holly Lane Ottawa, Ontario K1V 7P1	The Design and Development of a Bundling Attachment for Poplar Harvester Mark II	$31 234.00 (ENFOR) PAID BY CFS HQ ($22 130.76 pd 82-83)
Charles G. Turner & Assoc. Ltd. 1262 Don Mills Rd. Don Mills, Ontario M3B 2W7	A Feasibility Study on the Conversion of an Oil/Gas Heating Plant at CFB Borden, Ontario, to a Biomass Fueled Plant	$35 000.00 (ENFOR) PAID BY CFS HQ ($5468.75 pd 82-83)
Natcom Forestry Consultants Inc. 143 Lee Ave. Sault Ste. Marie, Ontario P6A 3W8	Preparation of a Report on Vapor and Density Preferences of Christmas Tree Species	$3500.00 ($3500.00 pd 82-83)
Arthur Jalkanen Jr. R.R. #1 Nipigon, Ontario	Study of Soil and Water Samples	$2500.00 ($2500.00 pd 82-83)
University of Guelph Office of the Bursar Trust Accounting Guelph, Ontario N1G 2W1	Growing Media Assessment for Germination and Early Growth of Coniferous Seedlings in Aerial Darts	$6920.00 ($6920.00 pd 82-83)
Natcom Forestry Consultants Inc. 143 Lee Ave. Sault Ste. Marie, Ontario P6A 3W8	Ecological Assessment of Strip Cutting in Upland Black Spruce	$24 407.00 ($23 185.00 pd 82-83 CLFRC) (1200.00 pd CWS 82-83)
University of Toronto Office of the Comptroller 215 Huron St. Toronto, Ontario M5S 1A2	Determination of the Toxicity of Aluminum to the Root Systems of Boreal Forest Tree Species Under Controlled Conditions	$69 447.00 ($23 966.78 pd 82-83 [LRTAP])
Forest Engineering Research Inst. of Canada 143 Place Frontenac Pointe Claire, Quebec H9R 4Z7	Development and Testing of a Rail Splitter (Experimental Prototype)	$163 420.00 ($163 393.54) (ENFOR) PAID BY CFS HQ (pd 83-83)

.....cont'd

CONTRACTS LET OR SUPERVISED BY THE GREAT LAKES FOREST RESEARCH CENTRE (concl'd)

Contractor's Name	Contract Title	Contract Amount
Forest Engineering Research Inst. of Canada 143 Place Frontenac Pointe Claire, Québec H9R 4Z7	Optimization of the Shearing Action and Pickup Efficiency of the Recufer Rotor	$69 421.00 (ENFOR) PAID BY CFS HQ ($25 220.99 pd 82-93)
Queen's University c/o Financial Section Kingston, Ontario K7L 3N6	The Degeneration Effects of Acid Precipitation on Important Eastern Canada Forest Soils	$210 112.00 ($94 528.00 [LRTAP] pd GLFRC 82-83) ($21 492.39 pd DSS 82-83)
Currie, Coopers and Lybrand 155 University Ave. 10th Floor Toronto, Ontario M5H 3B7	Evaluation of the Hybrid Poplar Development Component, New Forest in Eastern Ontario Program, Canada-Ontario Community and Rural Resource Development Agreement	$21 435.00 (Forestry Development) ($21 435.00 pd 82-83)
Research and Productivity Council P.O. Box 6000 Fredericton, New Brunswick	Research on Chemicals Attractive to the Native Elm Bark Beetle	$64 124.00 ($13 181.12 pd GLFRC 82-83) 9% paid by CFS 3% paid by FPMI 3% paid by NFRC 3% paid by LFRC 3% paid by NFRC
Enviraction 320 Adelaide St. London, Ontario N5Z 3L2	20 Analyses of Water Samples	$23 000.00 ($21 069.75 pd 82-83 GLFRC [LRTAP]) (pd 82-83 $6660 NWRI/IND) (pd 82-83 $4000 GLBL)
Keith Bowser Sault Ste. Marie, Ontario	Analysis of Organic and Inorganic Carbon Content of Env. Samples Collected in Turkey Lakes Watershed	$16 875.00 GLFRC ($5625.00 pd 82-82 [LRTAP]) ($625.00 pd 82-83 GLBL) ($625.00 pd 83-83 NWRI)
Barringer Magenta Ltd. 304 Carlingview Dr. Rexdale, Ontario M9W 5G2	Analysis of Colored Water Samples by Ion Chromatography Analysis for Sulphate and Chloride	$9736.00 ($11 907.00) [LRTAP] (pd 82-83)

Publications

BASHAM, J.T. 1982. Effects of herbicide treatment on the internal pathological quality of surviving aspen suckers. Dep. Environ., Can. For. Serv., Sault Ste. Marie, Ont. Inf. Rep. O-X-334. 26 p.

BASHAM, J.T. 1982. Scarification of 3-year-old aspen suckers: 4- and 6-year effects on, and a preliminary forecast of, the internal pathological quality of the survivors. Dep. Environ., Can. For. Serv., Sault Ste. Marie, Ont. Inf. Rep. O-X-341. 26 p.

CAYFORD, J.H. and McRAE, D.J. 1983. The ecological role of fire in jack pine forests. p. 183-199 in Ross W. Wein and David A. MacLean, Ed. The role of fire in northern circumpolar ecosystems. SCOPE Vol. 18, John Wiley & Sons Ltd.

DORWORTH, C.E. and DAVIS, C.N. 1982. Current and predicted future impact of the North American race of **Gremmeniella abietina** on jack pine in Ontario. Dep. Environ., Can. For. Serv., Sault Ste. Marie, Ont. Inf. Rep. O-X-342. 18 p.

DORWORTH, C.E., WEBB, D.P., KRYWIENCZYK, J. and McNAMARA, D. 1982. Comparisons between serologic and gas chromatographic techniques for characterization of **Gremmeniella abietina** and related species. Eur. J. For. Pathol. 12:209-217.

GROSS, H.L. 1982. Conversion efficiency: roundwood to sawn lumber. For. Chron. 58(6):267.

GROSS, H.L. 1983. Injuries to terminal shoots cause multiple-leadered nursery seedlings. Dep. Environ., Can. For. Serv., Sault Ste. Marie, Ont. Inf. Rep. O-X-347. 12 p.

HAAVISTO, V.F. 1982. The retention of seed viability in semi-serotinous black spruce cones. p. 92-95 in B.S.P. Wang, Ed. Proc. IUFRO Internatl. Symp. For. Tree Seed Storage. Dep. Environ., Can. For. Serv., Chalk River, Ont., 23-27 Sept. 1980.

HAAVISTO, V.F. and GORDON, A.G. 1982. Flushing black and white spruce flowers as an aid in predicting cone crops. Dep. Environ., Can. For. Serv./Ont. Min. Nat. Resour., Sault Ste. Marie, Ont. leaflet. (aussi disponible en français sous le titre "Aide à la prédiction de la production des cônes chez l'épinette noire et l'épinette blanche par la méthode de l'induction florale").

HOWSE, G.M., GROSS, H.L., SYME, P.D., MYREN, D.T., MEATING, J.H. and APPLEJOHN, M.J. 1982. Forest insect and disease conditions in Ontario, 1981. Dep. Environ., Can. For. Serv., Sault Ste. Marie, Ont. Inf. Rep. O-X-339. 49 p.

HOWSE, G.M., HARNDEN, A.A., MEATING, J.H. and CARROW, J.R. 1982. The 1980 spruce budworm situation in Ontario. Part A: Damage and forecasts. Part B: Aerial spraying operations. Dep. Environ., Can. For. Serv., Sault Ste. Marie, Ont. Inf. Rep. O-X-336. 93 p.

HUNTLEY, G.D. 1982. The elm - a resurgent resource or a persistent problem? p. 103-111 in E.S. Kondo, Y. Hiratsuka and W.B.G. Denyer, Ed. Proc. of the Dutch Elm Disease Symp. and Workshop, Winnipeg, Man. 5-9 Oct. 1981. Dep. Environ., Can. For. Serv./Dep. Nat. Resour., Prov. of Manitoba.

JEGLUM, J.K. 1982. Strip cutting in shallow-soil upland black spruce near Nipigon, Ontario. II. Regeneration in the first study area. Dep. Environ., Can. For. Serv., Sault Ste. Marie, Ont. Inf. Rep. O-X-337. 24 p.

JEGLUM, J.K. and COWELL, D.W. 1982. Wetland ecosystems near Kinoje Lakes, southern interior Hudson Bay Lowland. Nat. Can. 109: 621-635.

KETCHESON, D.E. 1982. The impact of strip cutting on logging costs. Pulp Pap. Can. 83(7): 29-30, 32, 34.

KONDO, E.S. 1982. Integrated systems of control of Dutch elm disease in Canada. p. 129-137 in E.S. Kondo, Y. Hiratsuka and W.B.G. Denyer, Ed. Proc. of the Dutch Elm Disease Symp. and Workshop, Winnipeg, Man. 5-9 Oct. 1981. Dep. Environ., Can. For. Serv./Dep. Nat. Resour., Prov. of Manitoba.

KONDO, E.S., HIRATSUKA, Y. and DENYER, W.B.G. 1982. Proceedings of the Dutch elm disease symposium and workshop, Winnipeg, Man. 5-9 Oct. 1981. Dep. Environ., Can. For. Serv./Dep. Nat. Resour., Prov. of Manitoba. 517 p.

LINDQUIST, O.H. 1982. Keys to lepidopterous larvae associated with the spruce budworm in northeastern North America. Dep. Environ., Can. For. Serv., Sault Ste. Marie, Ont. CANUSA Publ. 18 p. (aussi disponible en français sous le titre "Clés d'identification des larves de lépidoptères apparentées à la tordeuse des bourgeons de l'épinette dans le nord-est de l'Amérique du Nord").

LOZANO, F.C. and MORRISON, I.K. 1982. Growth and nutrition of white pine and white spruce seedlings in solutions of various nickel and copper concentrations. J. Environ. Qual. 11(3): 437-441.

McRAE, D.J. 1982. Physical properties of some Ontario slash fuels. Dep. Environ., Can. For. Serv., Ottawa, Ont. CFS Res. Notes 2(3): 21-22.

McRAE, D.J. 1982. Prescribed fire. Dep. Environ., Can. For. Serv., Sault Ste. Marie, Ont. GLFRC leaflet. 2 p. (aussi disponible en français sous le titre "Le brûlage").

MEATING, J.H., LAWRENCE, H.D., HOWSE, G.M. and CARROW, J.R. 1982. The 1981 spruce budworm situation in Ontario. Part A: Damage and forecasts. Part B: Aerial spraying operations. Dep. Environ., Can. For. Serv., Sault Ste. Marie, Ont. Inf. Rep. O-X-343. 92 p.

MERRIMAN, J.C., MOULTON, R.J., BERANEK, P. and SHAW, J.R. 1982. Water resources of the Hudson Bay Lowland: a literature review and annotated bibliography. Dep. Environ., Can. For. Serv., Sault Ste. Marie, Ont. Inf. Rep. O-X-338. 43 p.

NICOLSON, J.A., FOSTER, N.W. and MORRISON, I.K. 1982. Forest harvesting effects on water quality and nutrient status in the boreal forest. p. 71-89 in Can. Hydrol. Symp.: 82. Natl. Res. Counc. Can., 14-15 June, 1982. Fredericton, N.B.

PAYANDEH, B. 1982. Five-year growth response of northern Ontario peatland black spruce to fertilization and drainage. Dep. Environ., Can. For. Serv., Sault Ste. Marie, Ont. Inf. Rep. O-X-340. 20 p.

PAYANDEH, B. and HAAVISTO, V.F. 1982. Prediction equations for black spruce seed production and dispersal in northern Ontario. For. Chron. 58(2):96-99.

PLEXMAN, C.A. 1982. Bibliography of Great Lakes Forest Research Centre publications 1978-1982. Dep. Environ., Can. For. Serv., Sault Ste. Marie, Ont. Inf. Rep. O-X-345. 81 p + appendices.

PLEXMAN, C.A. 1982. Trees of Ontario: the ashes. Dep. Environ., Can. For. Serv., Sault Ste. Marie, Ont. GLFRC leaflet. 2 p. (aussi disponible en français sous le titre "Arbres de l'Ontario: les frênes").

RÉGNIÈRE, J. 1982. A process-oriented model of spruce budworm phenology (Lepidoptera: Tortricidae). Can. Ent. 114: 811-825.

RÉGNIÈRE, J. 1982. A probabilistic model relating stocking to degree of scarification and aerial seeding rate. Can. J. For. Res. 12(2):362-367.

RÉGNIÈRE, J. 1982. Popillia japonica (Coleoptera: Scarabaeidae): distribution and movement of adults in heterogeneous environments. Can. Ent. 115:287-294.

RICHARDS, W.C., TAKAI, S., LIN, D., HIRATSUKA, Y. and ASINA, S. 1982. An abnormal strain of **Ceratocystis ulmi** incapable of producing external symptoms of Dutch elm disease. Eur. J. For. Pathol. 12:193-202.

ROSE, A.H. and LINDQUIST, O.H. 1982. Cedar leaf miners. Dep. Environ., Can. For. Serv., Sault Ste. Marie, Ont. GLFRC leaflet. 2 p. (aussi disponible en français sous le titre "Mineuses des aiguilles du Thuya").

ROSE, A.H. and LINDQUIST, O.H. 1982. Yellow-headed spruce sawfly. Dep. Environ., Can. For. Serv., Sault Ste. Marie, Ont. GLFRC leaflet. 2 p. (aussi disponible en français sous le titre "Tenthrède à tête jaune de l'Épinette").

ROSE, A.H. and LINDQUIST, O.H. 1983. Insects of eastern hardwood trees. Dep. Environ., Can. For. Serv., Ottawa, Ont. 304 p. (aussi disponible en français sous le titre "Insectes des feuillus de l'est du Canada"). [$14.95 Canada, $17.95 other countries; available only at bookstores or from Canadian Government Publishing Centre, Ottawa, Ont. K1A 0S9].

SANDERS, C.J. 1982. Disruption of male spruce budworm orientation to calling females in a wind tunnel by synthetic pheromone. J. Chem. Ecol. 8(2):493-506.

SANDERS, C.J. and SILK, P.J. 1982. Disruption of spruce budworm mating by means of Hercon plastic laminated flakes, Ontario 1981. Dep. Environ., Can. For. Serv., Sault Ste. Marie, Ont. Inf. Rep. O-X-335. 24 p.

SCARRATT, J.B., GLERUM, C., and PLEXMAN, C.A. 1982. Proceedings of the Canadian containerized tree seedling symposium. Dep. Environ., Can. For. Serv., Sault Ste. Marie, Ont. COJFRC Symp. Proc. O-P-10. 460 p.

SIMS, R.A., COWELL, D.W. and WICKWARE, G.M. 1982. Classification of fens near southern James Bay, Ontario, using vegetational physiognomy. Can. J. Bot. 60(12):2608-2623.

SIMS, R.A., COWELL, D.W. and WICKWARE, G.M. 1982. Use of vegetational physiognomy in classifying treed peatlands near southern James Bay, Ontario. Nat. Can. 109:611-619.

SUTTON, R.F. 1982. Plantation establishment in the boreal forest: planting season extension. Dep. Environ., Can. For. Serv., Sault Ste. Marie, Ont. Inf. Rep. O-X-344. 129 p. + appendices.

VON ALTHEN, F.W. and STIELL, W.M. 1982. Update on the growth and yield of the Rockland red pine plantation. For. Chron. 58(5):211-212.

WHITNEY, R.D. and TIMMER, V.R. 1982. Chlorosis in planted white spruce at Limestone Lake, Ontario. Dep. Environ., Can. For. Serv., Sault Ste. Marie, Ont. Inf. Rep. O-X-346. 16 p.